

AMENDMENTS TO THE CLAIMS:

The listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF THE CLAIMS

1-32. (Cancelled).

33. (Currently Amended) A bolt and anchor assembly for securing a mine roof bolt, comprising:

a bolt;

a shell disposed on said bolt, said shell having a first end and a second end;

an expansion member axially disposed on said bolt adjacent said second end of said shell for expanding said shell to anchor said elongated bolt in an associated bore hole; and

a support device axially disposed on said bolt adjacent said first end of said shell, engagement between said support device and said shell sequentially (1) forces said expansion member into said shell to expand said shell to anchor said bolt in said associated bore hole while said support device remains axially fixed relative to said shell and (2) then only after said bolt is anchored in said associated bore hole allows axial movement of said support device in a direction toward and relative to said shell, ~~said support device able to axially move to said expansion member without said first end of said shell engaging and anchoring in said associated bore hole a base ring at said first end of said shell includes at least one split that extends to a recess defined between adjacent fingers of said shell and thereby facilitates said axial movement of said support device in said direction toward and relative to said shell to allow said support device to move through said base ring.~~

34-42. (Cancelled).

43. (Currently Amended) An expansion shell assembly, comprising:
an elongated bolt;

an expansion shell having fingers only at one end for engaging a rock formation and an aperture for receiving the elongated bolt;

an expansion member disposed on one end of the elongated bolt for expanding the fingers of the expansion shell; and

a shell support in contact with the elongated bolt and an opposite end of the expansion shell, the shell support (1) generally maintaining the axial position of the opposite end of the expansion shell relative to the elongated bolt while the expansion member forces the fingers of the shell to engage the rock formation and (2) moving axially relative to the expansion shell when the elongated bolt is tensioned after engagement the fingers of the shell to the rock formation, ~~said fingers at said one end engaged with said rock formation and said opposite end not engaged with said rock formation during any and all axial movement that tensions the roof bolt.~~

44-45. (Cancelled).

46. (Currently Amended) A method for anchoring and tensioning a mine roof bolt with an expansion shell assembly in a drilled hole, the expansion shell assembly including an expansion shell disposed on the mine roof bolt, an expansion member disposed on the mine roof bolt adjacent one end of the expansion shell for expanding the expansion shell and a support member disposed on the mine roof bolt adjacent another end of the expansion shell for supporting the expansion shell while the shell expands and tensioning the mine roof bolt after the shell expands, the method comprising:

inserting and advancing said mine roof bolt with said expansion shell assembly carried thereon upwardly into a drilled hole in a rock formation;

initially rotating said mine roof bolt to anchor said expansion shell assembly in said drilled hole with said support device axially fixed relative to said expansion shell; and

further rotating said mine roof bolt, after said step of rotating said mine roof bolt to anchor said expansion shell assembly in said drilled hole, to significantly tension said mine roof bolt with said support device axially moving into said expansion shell, wherein

~~said one end of said expansion shell is anchored to said rock formation during axial movement of said support device and said another end of said expansion shell rides up and over said support member without anchoring to said rock formation as said support device axially moves through said expansion shell to said expansion member.~~

47-48. (Cancelled).

49. (Currently Amended) An expansion shell assembly for mine roof bolts, comprising:

an expansion member threaded onto an associated bolt;

a support device annularly disposed around the associated bolt; and

a shell annularly disposed on the bolt between the expansion member and the support device, the shell having a base ring at one end thereof for engagement with the support device and fingers at an opposite end for engaging the expansion member, wherein said engagement between said base ring and said support device allows axial movement of said support device into and through said base ring of said shell to significantly and properly tension said associated bolt after said fingers of said shell are expanded by said expansion member, ~~said fingers anchored to a borehole into which said expansion shell assembly is inserted and said base ring at said one end of said shell incapable of anchoring to said borehole as a result of said support device moving into and through said base ring wherein a base ring at said first end of said shell includes at least one split that extends to a recess defined between adjacent fingers of said shell and thereby facilitates said axial movement of said support device in said direction toward and relative to said shell to allow said support device to move through said base ring.~~

50. (Previously Presented) A bolt and anchor assembly for securing a mine roof bolt, comprising:

a bolt;

a shell disposed on said bolt, said shell having a first end and a second end;

an expansion member axially disposed on said bolt adjacent said second end of said shell for expanding said shell to anchor said elongated bolt in an associated bore hole; and

a support device threadedly received on said associated bolt adjacent said first end of said shell, engagement between said support device and said shell sequentially (1) forces said expansion member into said shell to expand said shell to anchor said bolt in said associated bore hole while said support device remains generally axially fixed relative to said shell and (2) then after said bolt is anchored in said associated bore hole allows axial movement of said support device in a direction toward a relative to said shell.

51-52. (Cancelled).

53. (Previously Presented) The bolt and anchor assembly of claim 33 wherein said axial movement of said support device in said direction toward and relative to said shell occurs only after a predetermined force is applied on said shell by said support device.

54. (Previously Presented) The bolt and anchor assembly of claim 33 wherein said shell includes a base ring at said first end of said shell that is nearly circumferentially continuous and has only a single split to facilitate said first end of said shell being able to partially expand without engaging the associated bore hole upon application of a sufficient force on a bottom radial end of said base ring by said support device thereby facilitating said axial movement of said support device in said direction toward and relative to said shell and through said base ring.

55. (Previously Presented) The bolt and anchor assembly of claim 33 wherein said shell includes a radially thickened base ring at said first end having a weakened area that splits an otherwise circumferentially continuous structure and thereby facilitates said axial movement of said support device in said direction toward and relative to said shell to allow said support device to move through said base ring.

56. (Cancelled).

57. (Currently Amended) The ~~bolt-and-anchor~~ expansion shell assembly of claim [[33]] ~~43~~ wherein a base ring at said first end of said expansion shell includes at least one split that extends to a recess defined between adjacent fingers of said shell and thereby facilitates said axial movement of said shell support device in said a direction toward and relative to said expansion shell to allow said shell support device to move through said base ring.

58. (Currently Amended) The bolt and anchor assembly of claim [[57]] ~~33~~ wherein said axial movement of said support device in said direction toward and relative to said shell only occurs after a predetermined axial force of about 5,000 lbs. is applied on said shell by said support device.

59. (Withdrawn) The expansion shell assembly of claim 33 wherein the support device comprises a threaded lower support threadedly engaged with the elongated bolt and an upper support for reducing the amount of torque transferred to the expansion shell during installation.

60. (Withdrawn) The expansion shell assembly of claim 33 further comprising an antifriction washer adjacent a lower end of the support device for reducing the amount of torque transferred to the expansion shell during installation.

61. (Withdrawn) The expansion shell assembly of claim 33 wherein at least a portion of the support device includes an antifriction coating to reduce the amount of torque transferred to the expansion shell during installation.

62. (Withdrawn) The method of claim 46 further including the steps of:
positioning said support device on an unthreaded portion of the roof bolt between a threaded portion of the roof bolt and a shoulder of the roof bolt;

subsequently rolling threads on the threaded portion to generally restrict axial movement of the support device.

63. (Withdrawn) The expansion shell assembly of claim 33 wherein the support device is unthreaded and slidably received on the bolt between a shoulder of the bolt spaced from a head of the bolt and a distal end of the bolt inserted into the associated bore hole.

64. (Withdrawn) The bolt and anchor assembly of claim 33 wherein the support device is formed integrally with the elongated bolt.

65-66. (Cancelled).

67. (Previously Presented) The method of claim 46 wherein said step of rotating said mine roof bolt to anchor said expansion shell assembly including the sub-steps of:

- forcing said support device against said expansion shell;
- forcing said expansion shell against said support device; and
- forcing all fingers of said expansion shell to move radially outwardly to grip said rock formation.

68. (Previously Presented) The method of claim 46 wherein said step of further rotating said mine roof bolt includes the sub-steps of:

- forcing said support device axially into said expansion shell; and
- diametrically expanding a base ring of said expansion shell to allow said support device to move axially into and through said base ring of said expansion shell without further anchoring said shell in said drilled hole.

69. (Cancelled).

70. (Withdrawn) The expansion shell assembly of claim 43 wherein said shell support is threadedly engaged with said elongated bolt.

71. (Currently Amended) The expansion shell assembly of claim 49 wherein said base ring has an outer diameter small enough relative to the bore hole such that engagement between said base ring and said support device allows axial movement of said support device into and through said base ring with said shell riding upward over said support device.

72. (Withdrawn) The bolt and anchor assembly of claim 33 wherein said shell includes a base ring at said first end of said shell that fractures upon application of a sufficient force by said support device to facilitate the axial movement of said support device.

73. (Previously Presented) The bolt and anchor assembly of claim 33 wherein said support device has an outer transition surface that includes a straight portion generally parallel to an axis of the associated bolt and a tapered portion, and wherein said shell has a base ring for engaging said support device and fingers for engaging said expansion member wherein said base ring engages said tapered portion while said fingers of said shell are expanded by said expansion member and engages said straight portion after said fingers have expanded and while the bolt is tensioned.

74. (Previously Presented) The bolt and anchor assembly of claim 73 wherein said support device includes a transition radius portion between said tapered portion and said straight portion and wherein said base ring includes an aperture through which the bolt is received, said aperture defined by an inner wall of said base ring that engages said tapered portion while said base ring is expanded and engages said straight portion thereafter while said support device axially moves into said shell.

75. (Cancelled).

76. (Previously Presented) The method of claim 46 wherein significant tensioning begins occurring when rotation of the mine roof bolt causes said support member to provide a sufficient force to radially expand said expansion shell enough to permit axial movement of said support member within a base ring of said expansion shell and continues as said support member moves into and through said base ring.

77. (Withdrawn) The method of claim 46 wherein the tensioning occurs when the rotation of the mine roof bolt causes the support to provide a sufficient force to fracture the expansion shell to permit axial movement of the support device within said expansion shell.

78. (Previously Presented) The expansion shell assembly of claim 49 wherein the base ring has an outside diameter larger than an adjacent portion of said shell and said fingers each include a plurality of tapered gripping teeth.

79. (New) The method of claim 46 further including:

providing said expansion shell having a base portion including a slit extending from a first axial end of said base portion to a second axial end of said base portion, said expansion shell further having spaced apart fingers extending from said base portion, said slit and a recess defined between adjacent fingers together extending an entire longitudinal extent of said expansion shell.

80. (New) The method of claim 46 wherein said support device is threaded onto said mine roof bolt to a position slightly above and spaced apart from an unthreaded portion of said mine roof bolt.

81. (New) The method of claim 80 wherein said initial rotation of said mine roof bolt causes said support device to threadedly move downwardly along said mine roof bolt until reaching said unthreaded portion.